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09/773,358	01/31/2001	Alexander Kleinerman	2681/01231	4029
25937	7590	10/20/2004	EXAMINER VARTANIAN, HARRY	
ZARETSKY & ASSOCIATES PC 8753 W. RUNION DR. PEORIA, AZ 85382-6412			ART UNIT 2634	PAPER NUMBER

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/773,358

Applicant(s)

KLEINERMAN ET AL.

Examiner

Harry Vartanian

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 15-18, 26, 29-32, 35-43, 45-53 and 63 is/are rejected.
- 7) ☒ Claim(s) 6-14, 19-25, 27, 28, 33, 34, 44 and 54-62 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 January 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 4/01.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

The disclosure is objected to because of the following informalities: On pg. 20, line 10 the inner decoder is mislabeled. It should be labeled **134 NOT 143**.

Appropriate correction is required.

The disclosure is objected to because of the following informalities: Throughout the specification references have been made to applications without specifying the application number or filing date. For instance on Page 14, line 28.

Appropriate correction is required.

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 68, 144, and 294. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

The following claims are objected to:

1. Claims 1-18. Claim 1 recites the limitation "said channel" in lines 6-7. There is insufficient antecedent basis for this limitation in the claim. Please change to "said **communications** channel".

Moreover, Claim 1 recites the limitation "said at least one metric" in line 11. There is insufficient antecedent basis for this limitation in the claim. Please change to "said at least one **performance based** metric".

Moreover, Claim 1 recites the limitation "said soft decisions" in line 12. There is insufficient antecedent basis for this limitation in the claim. Please change to "[[said]] soft decisions". When making this correction, please also be aware of the reference to soft decisions in claims 15-17.

Claims 2-18 are objected to because they are dependent on an objected base claim.

2. Claims 13, 27, and 61 are objected to for the following reasons:  $\sigma_{\text{TRN}}$  and  $\sigma_{\text{Data}}$  are not defined.

3. Claims 19-25. Claim 19 recites the limitation "said channel" in lines 6-7. There is insufficient antecedent basis for this limitation in the claim. Please change to "said **communications** channel".

Moreover, Claim 19 recites the limitation "said soft decisions" in line 18. There is insufficient antecedent basis for this limitation in the claim. Please change to "[[said]] soft decisions".

Claims 20-25 are objected to because they are dependent on an objected base claim.

Art Unit: 2634

4. Claims 5, 6, 7, 23, 24, 25, 32, 33, 34, 53, 54, 55 are objected to for the following reasons: the purpose of the second equation is not defined. Also, what do the variables  $x$ ,  $K$ , and  $k$  represent? Are  $K$  and  $k$  integers? Is  $*$  the convolution operation? Is  $x^*$  the conjugate? Is  $\lfloor$  the floor operator?

5. Claims 26-34. Claim 26 is objected to for the following reasons: "said soft decisions" in line 12. There is insufficient antecedent basis for this limitation in the claim. Please change to "[[said]] soft decisions".

Claim 27 is objected to for the following reasons: "**said** weighted average" is not recited in the parent claim. The antecedent basis is "weighted average".

Claims 28-34 are objected to because they are dependent on an objected base claim.

6. Claims 35-48. Claim 35 recites the limitation "said transmitted signal" in line 7. There is insufficient antecedent basis for this limitation in the claim. Please change to "said **M-ary** transmitted signal".

Moreover, Claim 35 recites the limitation "said channel" in line 14. There is insufficient antecedent basis for this limitation in the claim. Please change to "said **communications** channel".

Moreover, Claim 35 recites the limitation "said at least one metric" in line 18-19. There is insufficient antecedent basis for this limitation in the claim. Please change to "said at least one **performance based** metric".

Art Unit: 2634

Moreover, Claim 35 recites the limitation "said soft decisions" in line 20. There is insufficient antecedent basis for this limitation in the claim. Please change to "[[said]] soft decisions".

Claim 39 and 40 are objected to because the acronym EDGE is not defined in the claim.

Claims 36-38 and 41-48 are objected to because they are dependent on an objected base claim.

8. Claims 49-63. Claim 49 recites the limitation "said channel" in lines 6-7. There is insufficient antecedent basis for this limitation in the claim. Please change to "said **communications** channel".

Moreover, Claim 49 recites the limitation "said at least one metric" in line 11. There is insufficient antecedent basis for this limitation in the claim. Please change to "said at least one **performance based** metric".

Moreover, Claim 49 recites the limitation "said soft decisions" in line 12. There is insufficient antecedent basis for this limitation in the claim. Please change to "[[said]] soft decisions". When making this correction, please also be aware of the reference to soft decisions in claim 63.

Claims 50-63 are objected to because they are dependent on an objected base claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2634

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 15, 18, 26, 35, 37-41, 43, 46-47, 49, and 63 are rejected under 35 U.S.C. 102(e) as being anticipated by Okanou et al (United States Patent #6,754,291).

Regarding Claim 1, Okanou et al meets the following limitations of the claim:

generating a first noise power estimate based on a training sequence transmitted along with data over said communications channel; **abstract**

generating a second noise power estimate derived from the data transmitted over said channel; **abstract**

generating at least one performance based metric based on the reception of said training sequence or on the reception of said data; **(Column 1, lines 60-66); (Column 2, lines 14-18)**

calculating a combined noise power estimate as a function of said first noise power estimate, said second noise power estimation and said at least one metric; and **abstract**

modifying said soft decisions in accordance with said combined noise power estimate so as to yield normalized soft decisions, said normalized soft decisions subsequently input to said outer decoder. **(Column 1, line 42 to Column 2, line 7)**

To paraphrase, Okanou et al uses reliability data and soft decisions to demodulate a distorted signal using metrics described in (Column 1, lines 60-66).

Regarding claim 15, Okanou et al meets the following limitations of the claim:

wherein said step of modifying said soft decisions comprises multiplying said soft decisions by said combined noise power estimate to yield normalized soft decisions. **Fig 8, item 308**

Regarding claim 18, applicant admits the limitation as prior art on Pg. 13, lines 13-15 and Pg. 15, lines 6-8.

Regarding claim 26, the rejection for claim 1 above meets the limitations of the claim.

Regarding claim 35, the rejection for claim 1 above meets the limitations of the claim.

Art Unit: 2634

Regarding claim 37 Okanou et al meets the following limitations of the claim:

further comprising circuit switch data means for converting said binary receive data to a data stream.  
**fig 9; (Column 8, line 9-15)**

Regarding claim 38, Okanou et al meets the following limitations of the claim:

further comprising packet switch data means for converting said binary receive data to a data stream.  
**fig 9; (Column 8, line 9-15)**

Regarding claim 39, applicant admits the limitation as prior art on Pg. 2, lines 4-5.

Regarding claim 40, applicant admits the limitation as prior art on Pg. 2, lines 4-5.

Regarding claim 41, applicant admits the limitation as prior art on Pg. 13, lines 13-15 and pg. 15, lines 6-8.

Regarding claim 43, applicant admits the limitation as prior art on Pg.13, lines 13-15 and pg. 15, lines 6-8.

Regarding claim 46, applicant admits the limitation as prior art on Pg.13, lines 13-15 and pg. 15, lines 6-8.

Regarding claim 47, applicant admits the limitation as prior art on Pg.13, lines 13-15 and pg. 15, lines 6-8.

Regarding claim 49, the rejection for claim 1 above meets the limitations of the claim.

Regarding claim 63, Okanou et al meets the following limitations of the claim:

wherein said computer program is suitably programmed to modify said soft decisions by multiplying said soft decisions by said combined noise power estimate to yield normalized soft decisions. **Fig 8, item 308**

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



Art Unit: 2634

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 2, 3, 29, 30, 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okanou et al (United States Patent #6,754,291). Okanou et al meets all the limitations of the claim except disclosing the use of SNR and BER as performance metrics. Instead, Okanou discloses the use of various thresholds(Column 1, lines 25-30) for decoding.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use SNR and BER as performance metrics. Applicant has not disclosed that using either SNR or BER performance metrics provides an advantage, is used for a particular purpose, or solves a stated problem. Therefore, it would have been obvious to one of ordinary skill in this art to modify Okanou et al to obtain the invention as specified in claims 2, 3, 29, 30, 50 and 51.

9. Claims 4, 5, 16, 17, 31, 32, 36, 52 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okanou et al (United States Patent #6,754,291) in view of Chen (United states Patent #6,775,521). Okanou et al meets all the limitations of the claim except disclosing that the noise power estimate is derived by "an ideal training sequence, a received training sequence and a channel estimate." Moreover, Okanou et al fails to teach

Art Unit: 2634

the use of a soft decision equalizer, demodulation decisions being made by both a hard and soft decision device, or a speech decoder.

However, Chen discloses the following in his GSM receiver:

"Next, the known training sequence is convolved with the estimated channel impulse response to obtain an estimate of the transmitted training sequence. An estimate of noise power is obtained by summing the magnitude squared of the difference between the received training sequence and the estimate of the transmitted training sequence. Then the ratio of estimated signal power and estimated noise power is denoted ESNR. A value of ESNR is computed for each burst and output to the BFI calculation 20. Additionally, the equalizer 16 performs its conventional function of processing the received burst 12 to mitigate inter-symbol interference and outputs a sequence of demodulation decisions 17 for the digital data bits of the burst to the frame decoding and re-encoding operation 18. The decisions 17 may be either hard-decision or soft-decision. The equalizer 16 also outputs stealing flags 24 of the burst 30 which are output to the BFI calculation 20. The stealing flags 24 are defined in FIG. 2. FIG. 2 shows the structure of a GSM normal burst which is used to carry user data such as digitally coded speech data..." (Column 3, line 66 column 4, line 10)

In addition, Chen discloses the use of a speech decoder in fig 1, item 22.

Therefor it would have been prima facie obvious to combine the features above of Chen with Okanou et al. A motivation to combine is stated by Chen wherein he states that the steps above are taken in order to prevent "bad" speech frames. His invention *"utilizes four-signal quality metrics to specify the bad frame criterion. In addition to the frame CRC, the estimated signal to noise ratio (ESNR) for each of the 8 bursts comprising the frame, estimated bit error count (EBEC) for the frame, and stealing flag values for the frame are used. By using the four metrics jointly in a bad frame criterion, the present invention substantially improves decoded speech quality and provides an optimum compromise between the opposing GSM performance requirements for low false bad frame indication and maximum frame error rate."* (Column 1, line 48-61) Moreover, Chen states that the use of a soft or hard decision equalizer helps to *"mitigate inter-symbol interference and outputs a sequence of demodulation decisions 17 for the digital data bits of the burst to the frame decoding and re-encoding operation 18. The decisions 17 may be either hard-decision or soft-decision."* (Column 4, lines 10-16)

Art Unit: 2634

A motivation to use a speech decoder is that it is a well-known block in wireless systems that require voice capability(for instance GSM, CDMA, TDMA, etc.).

10. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okanoué et al (United States Patent #6,754,291). Okanoué et al meets all the limitations of the claim except disclosing the use of a "M-ary symbol comprises an 8-PSK symbol".

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use a 8-PSK signaling scheme. Applicant has not disclosed that using a M-ary 8-PSK symbol provides an advantage, is used for a particular purpose, or solves a stated problem. Therefore, it would have been obvious to one of ordinary skill in this art to modify Okanoué et al to obtain the invention as specified in claim 42.

11. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okanoué et al (United States Patent #6,754,291) in view of Summer et al (United States Patent #6,240,133). Okanoué et al meets all the limitations of the claim except disclosing the use of "a hard decision symbol slicer in combination with a soft output generator."

However, Summer et al's receiver shows the use of a slicer outputting hard decision data with soft decisions produced by a bank of equalizers in figure 2. Therefor, it would have been prima facie obvious for Okanoué et al's receiver to use a hard decision slicer. A motivation to combine is that a slicer is a well-known block used in receivers to:

**"...slice the signal at equally spaced levels between reference levels for the received symbols. These output data decisions are then fed back to a linear delay line to remove intersymbol interference from future symbols."** **Summer et al** (Column 2, lines 10-20)

12. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okanoué et al (United States Patent #6,754,291) in view of Hatakeyama(United States Patent

Art Unit: 2634

#6,522,704). Okanou et al meets all the limitations of the claim except disclosing the use of software "to execute the normalization mechanism."

However, Hatakeyama's receiver has the following feature:

"As shown in FIG. 11, the de-repetition circuit 212 includes a data selector 221 for selecting the data D28 (fundamental data) of 384 symbols each outputted from the de-interleaver 211 or the data DR read out from the memory 213, a data hold circuit 222 for holding preceding data of two consecutive symbol data comprising data D61 selected by this data selector 221, an adder 223 for adding the preceding data held by this data hold circuit 222 and succeeding data forming a pair with the preceding data and transmitting added data to the memory 213 as write data DW and a normalization processing unit 224 for normalizing a bit rate of the data D61 (soft decision data) selected by the data selector 221 to provide normalized data of 4 bits and outputting the data thus normalized to the Viterbi decoder 214." (Column 10, line 47-61)

Therefor, it would have been prima facie obvious for a program to execute the normalization of the soft decision data. A motivation to combine is that it is well-known in the art that software implementations are more robust to future system changes than hardware implementations of a front-end processing unit.

### ***Allowable Subject Matter***

13. Claims 19-25 would be allowed if the above objections are overcome. Regarding claim 19, the reasons for allowance is the prior art failed to suggest the following limitation in the combination of steps in the claim:

calculating a combined noise power estimate solely as a function of said first noise power estimate when said at least one performance metric indicates said first noise power estimate has smaller estimation variance over said second noise power estimate;

calculating said combined noise power estimate solely as a function of said second noise power estimate when said at least one performance metric indicates...

14. Claims 6-14, 27-28, 33-34, 44, and 54-62 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2634


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 571.272.3048. The examiner can normally be reached on 10:00-6:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571.272.3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry Vartanian  
Examiner  
Art Unit 2634

HV

  
**STEPHEN CHIN**  
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